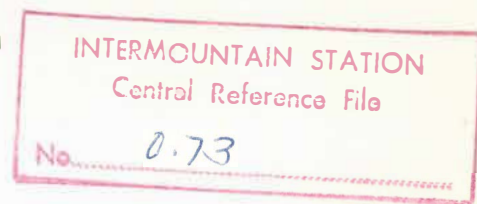


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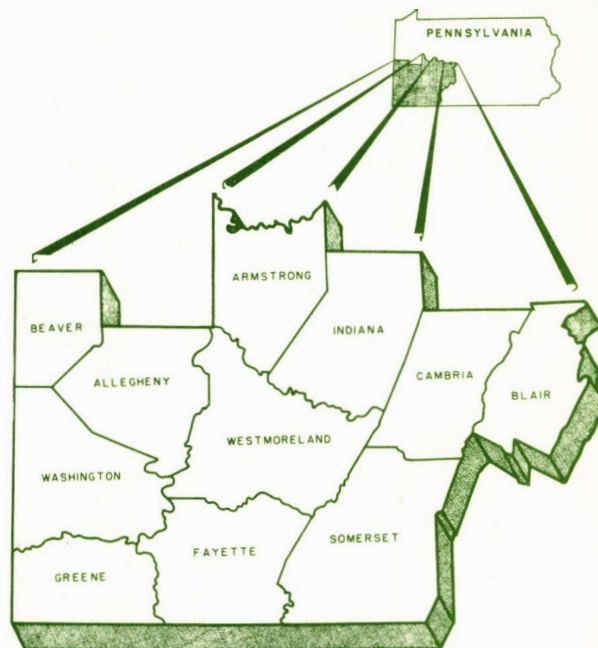
Upper Darby, Pennsylvania  
Ralph W. Marquis, Director



## Forest Statistics

for the

# Southwestern Section of Pennsylvania



Forest Statistics Series  
Pennsylvania No. 6

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## FOREWORD

This is the sixth in a new series of reports about forest areas and timber volumes in Pennsylvania. It is a product of the Forest Survey of the Northeast, carried on by the Northeastern Forest Experiment Station as part of the nationwide survey being made by the Forest Service, U. S. Department of Agriculture.

The Pennsylvania State Planning Board provided the aerial photographs used in the survey. The Pennsylvania Department of Forests and Waters provided office space and gave other valuable assistance.

Field work in the Southwestern Section of Pennsylvania was supervised by N. B. Griswold. The statistical procedures used were developed by C. Allen Bickford. Computations were made under the supervision of Roland H. Ferguson.

*Ralph W. Marquis*

RALPH W. MARQUIS  
Director

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# Forest Statistics for the Southwestern Section of Pennsylvania

*Prepared By The*

DIVISION OF FOREST ECONOMICS

*Northeastern Forest Experiment Station  
Forest Service, U.S. Dept. Agriculture*

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## GENERAL

IN SOUTHWESTERN PENNSYLVANIA is a vast area rich in mineral resources, bituminous coal, limestone, natural gas, and oil. This area is served by an excellent transportation network of waterways, railroads, and highways including Pennsylvania Turnpike.

Greene County occupies the southwest corner of the State. To the north and along the West Virginia state line lie Washington and Beaver Counties. To the east and along the West Virginia and Maryland boundaries lay Fayette and Somerset Counties. In about the center of this area are Allegheny and Westmoreland Counties. To the northeast is a tier of four counties: Armstrong, Indiana, Cambria, and Blair.

Greene and Washington Counties are principally agricultural, having approximately three-fourths of their land in farms. Almost 40 percent of their area is cropland, and better than 20 percent is open pasture land. At the other extreme is Allegheny County, a highly developed and densely

populated industrial area. Located in this county is Pittsburgh, situated at the confluence of the Monongahela and Allegheny Rivers, which unite here and form the Ohio River. Pittsburgh is Pennsylvania's second largest city, having a population of 676,800 (1950).

Throughout most of the Southwestern Section, the terrain is gently rolling and hilly with moderate slopes. The eastern half of Fayette County is rough and mountainous. The long ridge of the Allegheny Mountains forms the southeastern boundary of the section and the eastern boundary of Somerset County. Only Blair County lies farther east, and it is the most rugged county. Both Blair and Somerset Counties are noted for their scenic beauty.

#### *Forest Area*

The total land area in the Southwestern Section amounts to  $5\frac{1}{4}$  million acres. Less than half of this--2,196,300 acres--is forest land. Reserved from timber cutting are 14,200 acres of forest land in State and county parks. The remaining 2,182,100 acres are classed as commercial forest land.

Four of the eleven counties in this section--Blair, Cambria, Fayette, and Somerset--account for one-half of the commercial forest land, and each is more than 50 percent forested. Two counties, Allegheny and Washington, are less than 30 percent forested. Beaver County is the only one that has less than 100,000 acres of commercial forest land.

#### *Ownership*

Most of the forest land--93 percent--is privately owned. Farmers own almost 30 percent of the commercial forest land. Five large ownerships of more than 5,000 acres each account for 90,000 acres. The remainder is held by numerous owners having less than 5,000 acres each.

The State holds three-fourths of the publicly owned commercial forest land. State Forest lands amount to 35,700 acres, and State Game Lands amount to 77,500 acres. County and municipal holdings add up to 33,600 acres. The Federal government holds 5,200 acres of forest land for lock and dam sites.

#### *Forest Types*

Practically all the forest area is occupied by the hardwood forest types. Softwood forest types amount to

36,200 acres, 2 percent of the total commercial forest land. White pine is the predominant softwood type.

More than half the forest land is in the red oak forest type. Almost three-fourths of the forest land in Armstrong and Indiana Counties is in this type. The next predominant type is the sugar maple-beech-yellow birch forest type, which occupies 20 percent of the forest-land area. Almost half of the area in this type is found in Cambria and Somerset Counties. Other hardwood types--principally white oak, chestnut oak, and aspen-gray birch--make up 22 percent of the commercial forest land.

#### *Forest Stands*

Sawtimber stands occupy slightly more than one-fourth of the commercial forest land. Only a small portion of them carries more than 5,000 board feet per acre, amounting to  $3\frac{1}{2}$  percent of the commercial forest land; and yet one-fifth of the sawtimber volume in this section is concentrated on the 74,500 acres in this class.

Poletimber stands occupy 42 percent of the commercial forest-land area. Seedling-and-sapling stands and nonstocked forest areas occupy 32 percent. Most of this area is well stocked.

#### *Timber Volume*

Growing stock in the Southwestern Section amounts to 1.4 billion cubic feet. Of this, a little more than a half--776 million--is in sawtimber trees, and 658 million is in poletimber trees.

Included in this growing stock are a little more than 3 billion board feet (log scale, International  $\frac{1}{4}$ -inch rule) of sawtimber. Northern red oak alone accounts for one-fourth of the total board-foot volume. Black cherry follows with almost 10 percent. Four other species--chestnut oak, white oak, sugar maple, and yellow-poplar--have more than 200 million board feet each. All together these six species make up two-thirds of the total board-foot volume. Softwood species make up about 5 percent of the total.

#### *Pulpwood Volume*

According to pulpwood specifications developed by the Northeastern and Appalachian Technical Committees of the American Pulpwood Association, practically all of the growing stock is suitable for use by the pulp industry--including some large sawlogs and veneer-log material. In terms of

these specifications, there are almost 17 million rough standard cords of pulpwood bolts.

Hardwood species account for 97 percent of the total pulpwood volume, and of this about 60 percent is in the "hard" hardwoods--principally oak. Black cherry and red maple are the most abundant "soft" hardwoods. The pulpwood volume in the softwood species is predominantly white pine and hemlock.

Pulpwood stands averaging better than 5 cords per acre cover 55 percent of the commercial forest land. Of this, one-third carries more than 15 cords per acre. The remaining 45 percent of the forest is more lightly stocked.

SOUTHWESTERN SECTION OF PENNSYLVANIA

Table 1.--Land area by major classes, 1954

Class of land <sup>1</sup>	Area	
	Acres	Percent
Forest land:		
Commercial	2,182,100	42
Noncommercial <sup>2</sup>	14,200	(3/)
All forest land	2,196,300	42
Nonforest land	3,071,500	58
All land <sup>4</sup>	5,267,800	100

<sup>1</sup>See Appendix for definitions.

<sup>2</sup>Includes 12,000 acres in State Parks reserved from timber cutting.

<sup>3</sup>Less than 1 percent

<sup>4</sup>Census of Agriculture, 1950. Water areas of 1 to 40 acres are included in the estimate of nonforest acreage.

Table 2.--Land area and commercial forest-  
land area by county, 1954

County	Land area	Commercial forest-land area	
		Acres	Percent
Allegheny	467,200	129,000	28
Armstrong	422,400	170,700	40
Beaver	282,200	94,100	33
Blair	339,800	192,300	57
Cambria	444,800	259,000	58
Fayette	512,000	264,300	52
Greene	369,300	115,500	31
Indiana	531,800	221,700	42
Somerset	693,800	374,500	54
Washington	548,500	122,800	22
Westmoreland	656,000	238,200	36
All	5,267,800	2,182,100	42



SOUTHWESTERN SECTION OF PENNSYLVANIA

Table 3.--Commercial forest-land area  
by ownership, 1954

Ownership class	Acreage held	
	Acres	Percent
Private:		
Farm forest land <sup>1</sup>	632,100	29
Other private	1,395,000	64
Total private	2,027,100	93
Public: <sup>2</sup>		
State	116,200	5
Municipal	18,000	1
County	15,600	1
Federal	5,200	(2/)
Total public	155,000	7
All ownerships	2,182,100	100

<sup>1</sup>Census of Agriculture, 1950.

<sup>2</sup>Includes 35,700 acres of State Forest Lands and 77,500 acres of State Game Lands.

<sup>3</sup>Less than 1 percent.

Table 4.--Commercial forest-land area  
by forest type, 1954

Forest type	Area	
	Acres	Percent
Red oak	1,218,200	56
Sugar maple-beech-yellow birch	448,400	20
White oak	152,300	7
Chestnut oak	138,300	6
Aspen-gray birch	126,900	6
Other hardwood types <sup>1</sup>	61,800	3
Softwood types <sup>2</sup>	36,200	2
All types	2,182,100	100

<sup>1</sup>Includes 29,000 acres of ash-elm-maple types and 25,700 acres of yellow-poplar type.

<sup>2</sup>Includes 22,300 acres of white pine type.

SOUTHWESTERN SECTION OF PENNSYLVANIA

Table 5.--Commercial forest-land area by forest-type group  
and stand-size class, 1954

Forest-type group	Saw- timber stands	Pole- timber stands	Seedling-and- sapling stands and other areas	Total area
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
Red oak	286,800	546,900	384,500	1,218,200
Sugar maple-beech-yellow birch	122,700	252,000	73,700	448,400
White oak	60,800	29,300	62,200	152,300
Other forest types	93,400	91,100	178,700	363,200
All types	563,700	919,300	699,100	2,182,100
Percent	26	42	32	100

Table 6.--Commercial forest-land area by stand-size class  
and drainage area, 1954

Stand-size class	Drainage area				
	Allegheny River	Monongahela River	Ohio River Tributaries	Susquehanna River <sup>1</sup>	Youghiogheny River
	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>	<u>Acres</u>
Sawtimber stands:					
More than 5,000 board feet per acre	21,400	20,700	6,500	4,300	21,600
1,500 to 5,000 board feet per acre	185,300	20,600	49,000	119,500	114,800
Poletimber stands:					
More than 600 cubic feet per acre	167,600	51,100	17,800	91,800	47,800
200 to 600 cubic feet per acre	205,700	103,600	62,500	81,500	89,900
Other areas <sup>2</sup>	257,000	73,100	115,900	112,400	140,700
Total	837,000	269,100	251,700	409,500	414,800
Percent	38	12	12	19	19

<sup>1</sup>Includes 60,300 acres in Potomac River drainage area.

<sup>2</sup>Includes 672,300 acres in seedling-and-sapling stands.

SOUTHWESTERN SECTION OF PENNSYLVANIA

Table 7.--Net volume of live timber on commercial  
forest land by species, 1954

Species	Growing stock <sup>1</sup>	Saw- timber <sup>2</sup>	Suitable for pulpwood <sup>3</sup>
	<u>Thousand cu.ft.</u>	<u>Thousand bd.ft.</u>	<u>Thousand cords</u>
Hemlock	27,000	68,900	304
White pine	14,500	62,400	163
Other softwoods	5,300	16,500	59
All softwoods	46,800	147,800	526
Northern red oak	292,100	792,900	3,428
Other red oaks	28,500	77,200	334
Black cherry	201,000	300,800	2,359
Red maple	137,500	137,300	1,614
Chestnut oak	109,900	208,200	1,290
White oak	99,800	296,500	1,171
Sugar maple	87,300	220,800	1,025
Yellow-poplar	66,400	216,900	779
Elm	60,500	118,200	710
Hickory	48,700	110,000	572
Basswood	46,100	148,000	541
Ash	44,300	72,900	520
Beech	42,300	154,300	496
Black locust	34,400	70,000	404
Sweet birch	28,400	13,600	333
Other soft hardwoods	27,500	46,900	323
Other hard hardwoods	32,500	31,500	381
All hardwoods	1,387,200	3,016,000	16,280
All species	1,434,000	3,163,800	16,806

<sup>1</sup>See Appendix for definitions. Growing stock includes pulpwood and sawtimber.

<sup>2</sup>Log scale, International  $\frac{1}{4}$ -inch rule.

<sup>3</sup>4-foot bolts, including bark.

SOUTHWESTERN SECTION OF PENNSYLVANIA

Table 8.--Net volume of live timber on commercial forest land by diameter class, 1954

Diameter class <sup>1</sup> (in inches at breast height)	Growing stock	Saw- timber
	Thousand cu.ft.	Thousand bd.ft.
Softwoods:		
6	4,400	--
8	4,300	--
10	4,500	13,300
12	5,600	18,900
14	5,000	18,100
16	6,800	25,900
18 +	16,200	71,600
All softwoods	46,800	147,800
Hardwoods:		
6	193,600	--
8	217,900	--
10	237,600	--
12	175,000	579,600
14	148,000	593,200
16	104,200	458,400
18	89,700	363,600
20	49,500	197,700
22	54,700	237,900
24	45,500	215,900
26 +	71,500	369,700
All hardwoods	1,387,200	3,016,000
Total	1,434,000	3,163,800

<sup>1</sup>The midpoint of each 2-inch diameter class is indicated.

Table 9.--Net volume of live timber on commercial forest land by forest type, 1954

Forest type	Growing stock	Saw- timber	Suitable for pulpwood
	Thousand cu.ft.	Thousand bd.ft.	Thousand cords
Red oak	795,600	1,754,600	9,324
Sugar maple-beech-yellow birch	339,000	691,100	3,973
White oak	109,300	286,800	1,281
Chestnut oak	106,800	204,900	1,252
Other hardwood types	55,200	118,600	647
Softwood types	28,100	107,800	329
All types	1,434,000	3,163,800	16,806

SOUTHWESTERN SECTION OF PENNSYLVANIA

Table 10.--Average net volume of live timber per acre  
of commercial forest land, by  
stand-size class, 1954

Stand-size class (and acreage of each class)	Growing stock	Saw- timber
	<u>Cubic feet</u>	<u>Board feet</u>
Sawtimber stands:		
More than 5,000 bd.ft. per acre (74,500 acres)	2,000	8,900
1,500 to 5,000 bd.ft. per acre (489,200 acres)	1,300	3,500
Poletimber stands:		
More than 600 cu.ft. per acre (376,100 acres)	900	1,200
200 to 600 cu.ft. per acre (543,200 acres)	400	400
Other <sup>1</sup> (699,100 acres)	100	100
Average, all classes <sup>2</sup> (2,182,100 acres)	700	1,400

<sup>1</sup>Includes seedling-and-sapling stands and non-stocked areas.

<sup>2</sup>Hardwoods constitute 97 percent of the total growing stock or 95 percent of the total sawtimber volume. The average cubic volume of the total commercial forest area is equivalent to 8 cords per acre.

Table 11.--Area and volume by pulpwood volume-per-acre class, 1954

Pulpwood class	Area	Volume
	<u>Thousand acres</u>	<u>Thousand cords</u>
Less than 5 cords per acre	982	1,821
5 to 15 cords per acre	797	7,115
More than 15 cords per acre	403	7,870
Total	2,182	16,806

# A P P E N D I X

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## DEFINITIONS OF TERMS

### *Forest Area*

Forest-land area.--Includes (a) lands that are at least 10 percent stocked by trees of any size and capable of producing timber or other wood products, or of exerting influence on the climate or on the water regime; (b) land from which the trees described in (a) have been removed to less than 10 percent stocking and which has not been developed for other use; and (c) afforested areas. (Forest tracts of less than 1 acre, isolated strips of timber less than 120 feet wide, and abandoned fields and pastures not yet 10 percent stocked are excluded.)

Commercial forest-land area.--Forest land that is (a) producing, or physically capable of producing, usable crops of wood (usually sawtimber), (b) economically available now or prospectively, and (c) not withdrawn from timber utilization.

Noncommercial forest-land area.--Forest land (a) withdrawn from timber utilization through statute, ordinance, or administrative order but which otherwise qualifies as commercial forest land, and (b) incapable of yielding usable wood products (usually sawtimber) because of adverse site conditions.

### *Forest Types*

Forest types are classified according to the species or species group that accounts for the major portion of the stand in terms of cubic feet in sawtimber and poletimber stands, or the number of stems in seedling-and-sapling stands.

### *Stand-Size Classes*

Sawtimber stands.--Stands with sawtimber trees having a minimum net volume per acre of 1,500 board feet, International  $\frac{1}{4}$ -inch rule.

Poletimber stands.--Stands failing to meet the sawtimber stand specification, but at least 10 percent stocked

with poletimber and larger (5.0 inches and larger) trees, and with at least half the minimum stocking in poletimber trees. (Poletimber stands carry at least 200 cubic feet per acre.)

Seedling-and-sapling stands.--Stands not qualifying as either sawtimber or poletimber stands, but having at least 10 percent stocking of trees of commercial species and with at least half the minimum stocking in seedling-and-sapling trees.

Other areas.--Forest-land areas not qualifying as sawtimber, poletimber, or seedling-and-sapling stands. (Includes nonstocked areas.)

### *Tree Classes*

Sawtimber trees.--Trees of commercial species that contain at least one merchantable sawlog as defined by regional practice and that are of the following minimum diameters at breast height (d.b.h.): Softwoods 9.0 inches and hardwoods 11.0 inches. (All butt sawlogs are considered merchantable. Where the butt is defective, upper sawlogs are considered merchantable if they account--in terms of aggregate net volume--for 50 percent or more of the gross volume below the top of the uppermost sawlog. Softwood sawlogs are at least 6.0 inches in diameter inside bark at small end; 8 to 16 feet in length; sound and straight enough to be manufactured into standard lumber. The smaller logs are generally free of surface defects other than small tight knots. Hardwood sawlogs are at least 8.0 inches in diameter inside bark at small end; 8 to 16 feet in length; suitable for sawing into standard lumber, construction timbers, or ties.)

Poletimber trees.--Trees 5.0 inches d.b.h. and larger of commercial species that do not meet the specifications for sawtimber trees but do meet regional specifications of species, soundness, and freedom from defect. (These are the trees that are straight and clear enough to make sawtimber trees eventually.)

Seedling-and-sapling trees.--Trees of commercial species less than 5.0 inches in diameter at breast height.

Cull trees.--Live trees of sawtimber or poletimber size that are unmerchantable for sawlogs now or prospectively because of defect, rot, or species.

### *Timber Volume*

Growing stock.--Net volume, in cubic feet, of live sawtimber trees and live poletimber trees from stump to a minimum 4.0-inch top (of central stem) inside bark.

Live sawtimber volume.--Net volume in board feet, International  $\frac{1}{4}$ -inch rule, of live sawtimber trees.

Pulpwood.--Net volume in rough, standard cords (bark included) of growing stock, excluding sound defect as well as unsound defect.

### *Pulpwood Volume*

The pulpwood specifications used in this report are those set up by the Northeastern and Appalachian Technical Committees of the American Pulpwood Association.

Pulpwood trees.--Live trees of commercial species, 5.0 inches d.b.h. and larger, containing at least two contiguous pulpwood bolts and with 50 percent or more of the main stem volume usable for pulp. (A merchantable pulpwood bolt is a section of the main stem of a pulpwood tree, 4 feet long; 4.0 inches or larger inside bark at the small end; free from any indication of rot, charred wood, metal or hollow center; and contiguous to one or more sections meeting these same requirements. Crotches are excluded; sweep or crook in any section shall exclude the bolt if a line from the center of the top cut to the center of the bottom cut passes outside the wood at any point. Most of the sawtimber and poletimber trees are also defined as pulpwood trees.)

Pulpwood volume.--Net volume in standard cords (including bark), of the main stem of pulpwood trees, from the stump to a point where the top breaks up into branches, or to a minimum top diameter of 4.0 inches (inside bark). Deductions are made for all portions of the stem that fail to meet pulpwood bolt requirements.

### *Pulpwood Stands*

Less than 5 cords per acre: Stands with trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and with a net volume per acre of less than 400 cubic feet. (Includes seedling-and-sapling stands and nonstocked areas.)

5 to 15 cords per acre: Stands with trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and with a net volume per acre ranging from 400 to 1,200 cubic feet.



More than 15 cords per acre: Stands with trees 5.0 inches (d.b.h.) and larger that meet pulpwood specifications, and with a net volume per acre of more than 1,200 cubic feet.

## FOREST SURVEY METHODS

These forest statistics are based on information gathered from aerial photographs and from sample plots examined on the ground.

First, photo-interpretation plots were marked off on the aerial photographs. These plots were distributed uniformly by mechanical means over photographs of the entire district. Trained photo-interpreters then classified each photo-plot as either forest or nonforest. Forest plots were classified further according to stand-size and forest type.

Field crews inspected some of the photo-plots on the ground. Enough plots were selected at random so as to attain a specified level of statistical accuracy. Species and volume data were collected on these ground plots; and the photo classification of stand size and forest type was verified or--if necessary--changed.

The survey was designed for maximum efficiency in estimating total cubic volume to meet the national standards of accuracy.

## ACCURACY OF THE ESTIMATES

The estimates in this report may contain two kinds of error. First, photo-interpreters may make mistakes of judgment and fieldmen may make mistakes in measuring or recording. There is no practical way of finding out just how often such errors occur. But they are kept to a minimum by closely checking all phases of the work.

The second kind of error is associated with sampling procedures. The size of this sampling error can be measured. In the Southwestern Section of Pennsylvania the probabilities are 2 out of 3 that the actual forest area is within  $\pm 6.8$  percent of the estimated forest area, that the actual cubic-foot volume is within  $\pm 4.6$  percent of the estimated cubic-foot volume, and that the actual board-foot volume is within  $\pm 7.4$  percent of the estimated board-foot volume. This does not include any mistakes in measurement or classification.

These percentages show that the area estimates are more accurate than the volume estimates, and that the cubic-

foot estimates are more accurate than the board-foot estimates.

In each of the tables, the total figures are more accurate than the subtotals. The subtotals are more accurate than any of the individual figures. Figures that are small in relation to totals are subject to larger sampling errors.

## SPECIES TALLIED

The various commercial tree species tallied in the Southwestern Section of Pennsylvania are listed below. Approved common names<sup>1</sup> are shown in parentheses if they differ from the brief name used in the tables. Other tree species may occur in the area, but unless they were tallied on the field plots they were not included in the following list.

### *Softwoods*

Hemlock (Eastern hemlock)	- <u>Tsuga canadensis</u>
White pine (Eastern white pine)	- <u>Pinus strobus</u>
Other softwoods	
(Pitch pine)	- <u>Pinus rigida</u>
(Tamarack)	- <u>Larix laricina</u>

### *Soft Hardwoods*

Black cherry	- <u>Prunus serotina</u>
Red maple	- <u>Acer rubrum</u>
Yellow-poplar	- <u>Liriodendron tulipifera</u>
Elm	- <u>Ulmus</u> species
Basswood (American basswood)	- <u>Tilia americana</u>
Other soft hardwoods	
(Aspen)	- <u>Populus</u> species
(Willow)	- <u>Salix</u> species
(Butternut)	- <u>Juglans cinerea</u>
(Sweetgum)	- <u>Liquidambar styraciflua</u>
(Cucumbertree)	- <u>Magnolia acuminata</u>
(Black tupelo)	- <u>Nyssa sylvatica</u>
(American sycamore)	- <u>Platanus occidentalis</u>

<sup>1</sup>Little, Elbert L., Jr. Check list of native and naturalized trees of the United States (including Alaska). U.S. Dept. Agr., Agr. Handb. 41. 472 pp. 1953.

### *Hard Hardwoods*

Northern red oak	- <u>Quercus rubra</u>
Other red oaks	
(Black oak)	- <u>Quercus velutina</u>
(Scarlet oak)	- <u>Quercus coccinea</u>
Chestnut oak	- <u>Quercus prinus</u>
White oak	- <u>Quercus alba</u>
Sugar maple	- <u>Acer saccharum</u>
Hickory	- <u>Carya</u> species
Ash	- <u>Fraxinus</u> species
Beech (American beech)	- <u>Fagus grandifolia</u>
Black locust	- <u>Robinia pseudoacacia</u>
Sweet birch	- <u>Betula lenta</u>
Other hard hardwoods	
(Swamp white oak)	- <u>Quercus bicolor</u>
(Yellow birch)	- <u>Betula alleghaniensis</u>
(Black walnut)	- <u>Juglans nigra</u>
(Yellow buckeye)	- <u>Aesculus octandra</u>

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